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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/578,529

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Denis Hitz

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EXAMINER

DHINGRA, RAKESH KUMAR

ART UNIT

PAPER NUMBER

1716

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/578,529	<b>Applicant(s)</b> HITZ ET AL.	
	<b>Examiner</b> RAKESH DHINGRA	<b>Art Unit</b> 1716	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 May 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 May 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>05/03/2006</u> .  | 6) <input type="checkbox"/> Other: _____                          |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**Claims 1, 2, 8, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyake et al (US 6,335,535) in view of Alton (US 5,506,475).**

Regarding Claim 1: Miyake et al teach an ECR plasma chamber comprising:  
an enclosure 361 immersed in a magnetic configuration resulting from the superposition of a magnetic field (generated by electromagnetic coils 367) and radial (cusp) magnetic field (using magnets 371), wherein electron trajectories depends on the magnetic configuration; and

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at least one moderator 369 (conductive rods like an energy filter) having a position (between first and second plasma chambers 68, 70) and shape (so as to generate a weak magnetic field and function as an energy filter) in relation to the magnetic configuration such that the at least the moderator 369 allows low energy electrons and constitutes an obstacle to electrons whose energy is greater than a predetermined energy (e.g. Figs. 4-6, 10 and col. 14, line 12 to col. 16, line 48 and col. 18, line 58 to col. 22, line 8). Further, Miyake et al also teach (Fig. 6) that instead of the cusp magnetic field, a vertical field (in axial direction) can be formed to confine plasma (e.g. col. 16, lines 10-15).

Miyake et al do not explicitly teach the magnetic configuration comprises an axial magnetic field.

However use of magnetic configuration comprising axial and radial magnetic fields to confine plasma in ECR plasma apparatus is known in the art to obtain a large ECR volume that is symmetrically distributed to obtain large uniform plasma density distribution, as per reference cited hereunder.

Alton teaches an ECR plasma apparatus comprising a vessel 12, a first magnetic field generating means 20, and a second magnetic field generating means 24 that radial confinement means 26 and axial confinement means 28, to obtain a large ECR volume that is symmetrically distributed to obtain large uniform plasma density distribution (e.g. Fig. 2 and col. 5, lines 5-62).

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide the magnetic configuration comprising an axial magnetic field as taught by Alton in the apparatus of Miyake to obtain a large ECR volume that is symmetrically distributed to obtain large uniform plasma density distribution

Regarding Claim 2: Miyake et al in view of Alton teach the moderator 69 is located (between first and second plasma chambers) so as to have selectivity with respect to energy of electrons, which would also consequently control the number of low energy electrons passing to the second plasma chamber (col. 11, lines 20-45).

Regarding Claim 8: Miyake et al teach the moderator 69 comprises metal rods (conductive structure) {Fig. 4}.

Regarding Claim 11: Miyake et al teach the ECR plasma chamber 361 is part of an ECR plasma apparatus (col. 7, lines 29-35).

**Claims 3, 5, 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyake et al (US 6,335,535) in view of Alton (US 5,506,475) as applied to claims 1, 2, 8, 11 and further in view of Chen et al (US 5,703,375).**

Regarding Claim 3: Miyake et al in view of Alton teach all limitations of the claim except the materials of construction of the at least one moderator comprises materials that produce secondary electrons when they are subjected to collisions with high-energy electrons.

Chen et al teach a plasma apparatus comprising a plasma chamber with a moderator 200 (magnetic filter) that confines high energy electrons and permits lower energy electrons, and where the moderator 200 comprises conductive rods 208 (made from aluminum) and a ring 100 encircling the plasma. Chen et al also teach that when high energy electrons strike a metal surface, secondary electrons are emitted. Since the rods 208 in the moderator are made from aluminum and are placed in the path of high energy electrons, secondary electrons would

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obviously be produced upon collision with high energy electrons (e.g. Figs 2, 18, 19, 23 and col. 1, lines 45-62 and col. 6, line 14 to col. 8, line 30).

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide the moderator with a material that produces secondary electrons upon collision with high energy electrons as taught by Chen et al in the apparatus of Miyake et al in view of Alton to enable use these for impacting the substrate.

Regarding Claim 5: Miyake et al in view of Alton teach that moderator 69 comprises active portion (conducting rods). Further, Chen et al teach the plasma apparatus comprising a moderator 200 (magnetic filter) that confines high energy electrons and permits lower energy electrons, and where the moderator 200 comprises an active portion 208 (rods) and a ring 100 encircling the plasma (e.g. Figs 2, 18, 19, 23 and col. 6, line 14 to col. 8, line 30).

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide the moderator with a ring encircling the plasma as taught by Chen et al in the apparatus Miyake et al in view of Alton to provide support to the active element in the plasma chamber.

Regarding Claim 7: Chen et al teach the active portion 208 is mounted at the end of a support portion 202 (which could be a rod also), and wherein the support portion 202 is itself fixed to the ring 100 (e.g. Chen et al – Fig. 19). Further, it would be obvious to change the shape the support portion 202 to be as assembly of support rods depending upon engineering choice considerations.

Further, it has been held that:

The configuration was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed container was significant (In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966))

**Claims 4, 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyake et al (US 6,335,535) in view of Alton (US 5,506,475) as applied to claims 1, 2 and further in view of Jacquot (US 4,631,438).**

Regarding Claim 4: Miyake et al in view of Alton teach all limitations of the claim except that the radial magnetic field includes  $2n$  poles and the at least one moderator includes  $n$  active portions each of which is placed in a respective one of the  $n$  branches formed by the electron trajectories.

Jacquot teaches an ECR ion source comprising an enclosure 2 immersed in magnetic configuration comprising axial and radial magnetic components 16, 20 respectively (with respect to an axis 18). Jacquot further teaches that the radial magnetic component can include  $2n$  magnetic poles 30a which could enable to form  $n$  equi-magnetic caps 32, on which ECR condition is satisfied (e.g. Figs. 1, 2 and col. 2, line 60 to col. 4, line 14). It would be obvious to configure the currents in the conductive rods 69) moderator to align with the branches of the ECR trajectories to obtain local high energy plasma.

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide the radial magnetic field as including  $2n$  poles and the at least one moderator includes  $n$  active portions each of which is placed in a respective one of the  $n$

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branches formed by the electron trajectories, as taught by Jacquot in the apparatus of Miyake et al in view of Alton to obtain local high energy plasma.

Regarding Claim 10: Miyake et al in view of Alton and Jacquot teaches an ECR ion source comprising an ECR plasma chamber (col. 2, lines 60-65).

**Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyake et al (US 6,335,535) in view of Alton (US 5,506,475) and Chen et al (US 5,703,375) as applied to claim as applied to claim 5 and further in view Roberts (US 5,391,962).**

Regarding Claim 6: Miyake et al in view of Alton and Chen et al teach all limitations of the claim including the moderator comprising an active portion consisting of cylindrical rods 208 and a ring 100, but do not explicitly teach the cylindrical rod is radially located in a transverse plane of the plasma chamber wherein a first end of the rod 208 points toward a central region of the plasma chamber.

Roberts et al teach a plasma apparatus comprising a moderator that includes a plurality of rods 48 (active portion), that are radially located in a transverse plane of the plasma chamber and wherein a first end of the rod 48 points toward a central region of the plasma chamber 40 (e.g. Figs. 1 and col. 4, lines 40-50 and col. 5, lines 35-50).

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to moderator with cylindrical rods radially located in a transverse plane of the plasma chamber and wherein a first end of the rod points toward a central region of the plasma chamber 40 as taught by Roberts et al in the apparatus of Miyake et al in view of Alton and Chen et al to enable to prevent energetic electrons from going past the electrode in the plasma chamber.



**Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyake et al (US 6,335,535) in view of Alton (US 5,506,475) as applied to claims 1, 2 and further in view of Leung et al (US 4,447,732).**

Regarding Claim 5: Miyake et al in view of Alton teach all limitations of the claim except that a portion of the moderator comprises a ceramic structure.

Leung et al teach a plasma ion source comprising a moderator 90 that includes ceramic permanent magnets 86 (e.g. Fig. 2 and col. 5, line 55 to col. 6, line 25).

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide the moderator as comprising a ceramic structure as taught by Leung et al in the apparatus Miyake et al in view of Alton as known material used for making permanent magnets.

Further, it has been held that:

The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945)

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RAKESH DHINGRA whose telephone number is (571)272-5959. The examiner can normally be reached on 8:30 - 5:00 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/R. D./

Examiner, Art Unit 1716

/Karla Moore/

Primary Examiner, Art Unit 1716